

WHAT IS CLAIMED IS:

1           1.     A light beam display, comprising:  
2           a display screen having a vertical and a horizontal dimension;  
3           a source of one or more light beams;  
4           an optical path between the display screen and the light beam source for  
5 directing said one or more light beams to the display screen, including a movable  
6 reflector having a plurality of reflective facets for providing horizontal scanning of the  
7 light beams and a horizontal scan line distortion correction lens;  
8           an optical mechanical element for vertically shifting the light beams so as to  
9 illuminate different scan lines of the display screen; and  
10          control electronics for controlling the scan timing to compensate for varying  
11 scan line length introduced by said horizontal scan line distortion correction lens.

1           2.     A light beam display as set in claim 1, wherein the movable reflector is  
2 a rotatable polygon.

1           3.     A light beam display as set in claim 1, wherein the horizontal scan line  
2 distortion correction lens has optical distortion substantially greater than an f-theta  
3 lens.

1           4.     A light beam display as set out in claim 1, wherein said horizontal scan  
2 line distortion correction lens has maximum optical distortion in a range between  
3 about 10% greater distortion and 500% greater distortion than an f-theta lens  
4 through a horizontal field angle of 8 – 28 degrees.

1           5.     A light beam display as set out in claim 4, wherein said horizontal scan  
2 line correction lens comprises an aspheric lens.

1           6.     A light beam display as set out in claim 3, wherein said optical path  
2 further comprises a collimating lens.

1           7.     A light beam display as set out in claim 6, wherein said light beam  
2 source comprises an array of LED's and wherein said collimating lens introduces  
3 distortion into the plural light beams substantially opposite to said horizontal scan  
4 line distortion correction lens.

1           8.     A light beam display as set out in claim 7, wherein said horizontal  
2 distortion correction lens is configured in the optical path between the display screen  
3 and movable reflector and the collimating lens is configured in the optical path on the  
4 opposite side of the movable reflector.

1           9.     A light beam display as set out in claim 8, wherein said horizontal  
2 distortion correction lens is an assembly of lens elements collectively providing the  
3 desired distortion.

1           10.    A light beam display as set out in claim 1 further comprising an input for  
2 receiving video data, the video data including a plurality of horizontal lines of display  
3 information and wherein said control electronics comprises a memory for storing  
4 video data and a timing control circuit for controlling timing of read out of video data  
5 from the memory in accordance with the horizontal line number of said video data.

1           11.    A light beam display as set out in claim 10, wherein said timing control  
2 circuit comprises:  
3           a pixel clock converter for adjusting the pixel clock for each scan line; and  
4           a start of line converter for adjusting the start timing for each scan line.

1           12.    A light beam display as set out in claim 11, wherein said pixel clock  
2 converter increases the pixel clock rate for scan lines closer to the edge of the  
3 display.

1           13.    A light beam display as set out in claim 11, wherein the start of line  
2 converter provides a variable delay as the scan lines are closer to the edge of the  
3 display.

1           14.    A method of displaying information on a display screen employing one  
2 or more light beams, comprising:

3               directing a light beam to the display screen via an optical path including a  
4 movable reflector having plural reflective facets;

5               scanning the light beam in a horizontal direction using the movable reflector  
6 to trace out a horizontal scan line;

7               distorting the light beam while traversing said optical path to correct  
8 nonlinearity in the horizontal scan line introduced by the movable reflector;

9               shifting the light beam in the vertical direction; and

10              adjusting the timing of the scanning based on the vertical position of the  
11 horizontal line in the screen to correct scan length distortion.

1           15.    A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 14, wherein said adjusting of the timing is  
3 performed on a line by line basis.

1           16.    A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 14, wherein said adjusting of the timing  
3 comprises controlling the rate of read out of horizontal lines of video information from  
4 a video memory based on the horizontal line being scanned.

1           17.    A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 16, wherein the read out rate is altered  
3 nonlinearly with horizontal line number.

1           18.    A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 16, wherein said adjusting of the timing

3 further comprises controlling the start of line timing based on the horizontal line  
4 being scanned.

1 19. A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 14, wherein said distorting the light beam  
3 comprises providing a distortion greater than an f-theta lens.

1 20. A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 19, wherein the distortion is between about  
3 10% and 500% greater than the distortion of an f-theta lens through a horizontal  
4 scan field angle of about 8 – 28 degrees.

1 21. A method of displaying information on a display screen employing one  
2 or more light beams as set out in claim 14, wherein said movable reflector is a  
3 rotatable polygon.

1 22. A light beam scanning system, comprising:  
2 a source of one or more light beams;  
3 a rotatable polygon having a plurality of reflective sides, configured to  
4 intercept said one or more light beams and scan said one or more light beams in a  
5 first direction to create a first scan line;  
6 means for shifting the one or more beams to create plural additional scan  
7 lines displaced in a second direction from said first scan line;  
8 means for distorting the one or more light beams to correct bowing of the  
9 scan lines and introducing distortion in the second direction; and  
10 timing means for correcting the distortion in the second direction.

1 23. A light beam scanning system as set out in claim 22, wherein said  
2 means for distorting comprises a lens having distortion greater than an f-theta lens.

1           24.    A light beam scanning system as set out in claim 23, wherein said  
2 means for distorting comprises a lens having distortion between about 10% and 75%  
3 greater than an f-theta lens through at least a portion of the field angle.

1           25.    A light beam scanning system as set out in claim 22, wherein said  
2 timing means provides a variable timing delay based on the amount of shifting of the  
3 scan lines in the second direction.

1           26.    A light beam scanning system as set out in claim 22, wherein said  
2 timing means provides a variable pixel clock rate based on the amount of shifting of  
3 the scan lines in the second direction.

1           27.    A method for correcting scan line bowing in a rotatable polygon  
2 reflector light beam scanning system, comprising:  
3           distorting the light beam by an amount substantially greater than the distortion  
4 provided by an f-theta lens to remove the scan line bow introduced by the rotatable  
5 polygon reflector; and  
6           correcting scan line length variation introduced by said distorting.

1           28.    A method for correcting scan line bowing as set out in claim 27,  
2 wherein said distorting provides a maximum distortion between about 10% and  
3 500% greater than the maximum distortion of an f-theta lens through a field angle of  
4 8 – 28 degrees.

1           29.    A method for correcting scan line bowing as set out in claim 27,  
2 wherein said correcting scan line length variation comprises adjusting the start of  
3 line timing.

1           30.    A method for correcting scan line bowing as set out in claim 29, wherein said  
2 correcting scan line length variation further comprises adjusting the scan line length  
3 by adjusting a pixel clock rate for the scan line.